Correlates of brain dysfunction in children

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SUMMARY

The object of this thesis is to study relationships between perinatal risk factors and neurological, behavioural and cognitive development at schoolage. The neonatal neurological condition was chosen as the parameter of perinatal risk (Chapter 1).

On the basis of a review on current literature (Chapter 2) it is concluded that *a)* neonatal neurological abnormalities, preterm birth and intrauterine growth retardation (IUGR) are associated with an increased risk for neurological deviancy in childhood; *b)* prematurity and IUGR are associated with a higher rate of educational difficulties; *c)* the role of perinatal factors in behavioural development is obscure.

Chapter 3 describes the studypopulation, the follow-up methods and the statistical techniques. Perinatal risk factors and social determinants are strongly interrelated. Therefore, besides univariate statistical methods, logistic regression analysis was applied to assess the individual and joint effects of a set of variables on deviant outcome.

A statistically siginificant relation was found between mild (Chapter 4) and definite (Chapter 5) neonatal neurological abnormalities and neurological findings at six years. Obstetrical complications, disturbances of the neonatal course and interval complications appeared to play an additional role in determining deviant outcome, indicating the need of multivariate analysis techniques. Both follow-up and neonatal neurological condition were related in a varying degree to undesirable behaviour, but the variance of behaviour was only partially explained by the neurological findings.

Chapter 6 reports on the developmental outcome of low birthweight infants. Major and minor neurological abnormalities were more frequent in the groups of full term, small-for-gestational age (FT-SGA), preterm, appropriate-for-gestational age (PT-AGA) and PT-SGA infants than in a reference group of FT-AGA infants. Logistic regression analysis showed that major and minor neurological dysfunction were associated with different sets of risk factors; the only factor which they shared was the neonatal neurological condition. The results suggested a temporal difference in potentially harmful factors: for neurological handicap early in pregnancy, for MND in the second half of gestation and the first two postnatal years.

At nine years of age neurological findings and cognitive development could be further differentiated (Chapter 7). Two types of minor neurological dysfunction (MND) were distinguished. The more severe variant (MND-2) was related to more, and also other perinatal events than the milder variant MND-1. Unlike the former, the latter was not related to the neonatal neurological classification.

Multivariate analysis of behaviour and cognitive development at six (Chapter 6) and nine (Chapter 8) years of age clearly revealed the complexity of perinatal-developmental relationships. Definite neonatal neurological abnormalities contributed directly and - preponderantly - indirectly (via MND-2) to behavioural and cognitive development. Very preterm birth (<34 weeks) was the sole obstetrical variable which was statistically significantly associated with some aspects of behavioural and cognitive development. However, preterm delivery is a complex obstetrical variable. A relationship with variables such as asphyxia or acidaemia was not found.

Chapter 9 contains a general discussion with the following conclusions:

1) The majority of infants with neonatal neurological dysfunction recover.
2) Neonatal neurological condition and neurological, cognitive and behavioural development at schoolage are statistically significantly but differently related. However, it must be emphasized that individual prediction on the basis of the relationships is not possible.
3) Prematurity and severe IUGR are the sole obstetrical variables of which a direct contribution to deviant outcome was found. Prematurity related to neurological, behavioural and cognitive sequelae, IUGR to neurological dysfunction only.
4) The point of time of the insult may be different in neurological handicap and MND: in the case of the former the point of time seems to be very early in pregnancy, in the case of the latter during the second half of pregnancy and the first two years of life.
5) MND is not an entity: at least two clinically and aetiologically distinct variants can be distinguished.
6) Presence and severity of MND are significantly related to cognitive development and some aspects of behaviour (clumsiness, distractability).
7) Perinatal-developmental studies must take into account - besides follow-up age - the sex of the child, the social class and the occurrence of interval complications.